REMARKS

Cancel claims 1 and 2.

Claims 3-8, 11, 12, 15, 16, 19, and 21 define a galvanizing roll assembly submerged in molten metal and having a roller bearing. Neither European '569, Kleimeyer, or Morando '517 cited by the Examiner suggest using a roller bearing in a submerged galvanizing roll assembly.

The advantages of using a roller bearing in this environment is described in pages 2-7 of the application. Roller bearings reduce the service unit loading by multiple line contact.

A conventional roller bearing typically has two points of contact, one with a non-rotating element and the other with a rotating element. In each case the element having the larger bearing surface will cause the roller to slide part of its travel because the radius of the outer race is greater than the radius of the inner race. The invention of these claims eliminates sliding friction between the roller and the cage by having a clearance sufficient that a hydrodynamic lubricating film is created between the roller and the cage.

Applicant's invention, as now claimed claims various ways to eliminate metal to metal contact between the rollers and the trunnion. In page 3 of the Office Action, the Examiner refers to the art as eliminating the need for lubrication of the bearings and describes a motivation for replacing the bearings of European '569 or Kleimeyer et al to eliminate the need to lubricate the bearings.

Applicant's invention does not eliminate the need for lubricating the bearings. In fact, claim 3 defines a roller structure which is not suggested by an appropriate combination of the cited art. Claim 4 defines the hydrodynamic lubricating molten metal film between the roller and the recess which is not suggested by any of the Prior Art. Claims 5, 6, 7, and 8 all depend from claim 3 and are therefore believed to be allowable. Claim 21 describes a roller bearing which is disposed in a galvanizing pot and not suggested by the cited art.

New claim 22 defines a multiple roller bearing structure. None of the references suggest a multiple roller bearing structure disposed in a galvanizing environment. Claim 15 recites a roller bearing assembly, which is not suggested by the art, as well as an annular clearance between each of the rollers and its respective recess for passing a hydrodynamic lubricating molten metal film as the roller is being rotated in molten metal.

The invention defined by the amended claims describes a product that forms a hydrodynamic film without using a pump. The film is created by using a plurality of rollers held in a cage. Thus, the value of N_r (rpm) is increased as the value of F_r is decreased by the number of rollers. The contact area is increased and:

$$30 < K_R = \frac{\mu N_R}{P_R} = \frac{\mu N_R}{\frac{F_R}{A_R}} < 1000$$

by using roller-cage design

$$K_R = 124.6 >> K_T = 2$$

K_R = Hydrodynamic coefficient with roller design

K_T = State of the art trunnion bearing design

In other words increase K (hydrodynamic coefficient) to be 30<K<1000

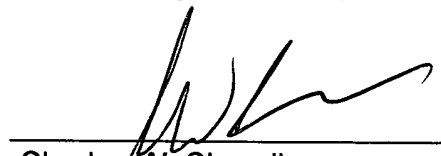
One of the advantages of employing a structure for a galvanizing bath in which the multiple rollers have hydrodynamic film between the roller and the cage is that it accommodates changes in instability of the roll. This solves the problem that would be expected to exist in Kleimeyer because nothing prevents the roll from jumping as high as it wants.

Unlike a journal bearing, roller bearings are very stable and not affected by vibration.

The present invention does not require a pump because one of the factors in the creation of hydrodynamic film is the rpm of the rollers. In this case, the rollers are five to eight times the speed of a trunnion.

Accordingly, it is believed that all the pending claims are in condition for allowance.

Respectfully submitted,



Charles W. Chandler
P.O. Reg. No. 24,290
Attorney for Applicant
33150 Schoolcraft
Livonia, MI 48150
(734) 522-0920

CERTIFICATE UNDER 37 CFR 1.8 (a)

I hereby certify that the foregoing Response is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Mail Stop Fee, Commissioner of Patents and Trademarks, P.O. Box 1450, Alexandria, VA 22313-1450 on October 1, 2003